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Explosives Department
Atomic Energy Division
Wilmington, Delaware
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Reviewing
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Date 2/4/89
MINUTES OF TECHNICAL DIVISION STEERING COMMITTEE MEETING
NOVEMBER 21, 1955 - SAVANNAH RIVER LABORATORY

Committee Members Present

D. F. Babcock	M. H. Wahl
J. W. Croach	C. W. J. Wende
Gerhard Dessauer	J. C. Woodhouse
L. C. Evans	Hood Worthington
J. W. Morris	V. R. Thayer

APPROVALS

The following Studies were approved for the programs outlined in the appendixes:

Study No.	Title	Man Months	From	To
8506	100 Area - Chemical Development	19	11/1/55	1/31/56
8507	100 Area - Reactor Component Design Studies	24	11/1/55	1/31/56
8509	100 Area - Hydraulic and Heat Transfer Studies	33	11/1/55	1/31/56
8518	Theoretical Physics	40	11/1/55	1/31/56
8519	Experimental Pile Physics	70	11/1/55	1/31/56
8520	100 Area - Development Engineering	38	11/1/55	1/31/56

MASTER

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INFORMATION AND AGREEMENTS REACHED

1. Safety

The Laboratory's minor injury frequency for October was 0.29, up from 0.24 for September. None of the October injuries had serious implications and about 80% were to hands and fingers. A number of unsafe practices have been noted and are being used as material for safety meetings.

The entire basement of Building 773-A is now an eye-protection area.

A ventilation survey recently completed by the Engineering Department indicates that certain doors must be kept closed to maintain proper control in some areas where active materials are handled. The Laboratory is taking the necessary steps to maintain proper control.

2. The Laboratory had six security violations in October, an increase from two in September.

3. We should do what we can to protect the confidential information of companies with whom we deal.

4. The Laboratory is establishing a procedure for maintaining proper development notebooks.

5. The Laboratory will take immediate steps to provide dehumidified storage conditions for uranium metal. Possible future needs for additional storage space are being considered.

6. The Steering Committee agreed that the necessary papers should be submitted for approval and authorization to modify CMX facilities for:

- (a) Increasing the capacity for hydraulic and monitoring tests.
- (b) Increasing the capacity for flow testing prototype elements prior to irradiation.
- (c) Providing a means for making preliminary tests of cross-flow effects associated with increased moderator flow rates.

7. D. F. Babcock will determine if and when slug loading for tritium production might be required and will advise the Laboratory accordingly. This information will establish whether the Laboratory should place any efforts on this process and, if so, when.

8. Elements for Tritium Production

The following summarizes the Technical Division program as covered in the Steering Committee Meeting and modified in accordance with conclusions reached at the November 21

meeting with AED management.

- (a) A version of the Mark IV element will be developed using an enriched fuel tube and Li-Al target slugs. This work will be done to provide assurance that an element capable of operation at higher power levels will be available when required by production schedules. Test irradiations of this assembly (or with thorium slugs if necessary in the near future) will be continued to provide experience with enriched fuel tube assemblies. A minimum of development work and no new aluminum extrusion will be required for this work.
- (b) The Laboratory will continue work on the design of a Mark VI assembly based on the following:
 - (1) Parallel flow
 - (2) Semipermanent sleeve unchanged
 - (3) Arrangement from outside in:
Li-Al housing tube, enriched fuel tube with external ribs, enriched fuel tube with external ribs, inner housing tube with external ribs.
 - (4) 150,000 to 160,000 gpm D₂O pumping capacity.

Preliminary designs on both the modified Mark IV and the Mark VI elements mentioned above will be reviewed at the Laboratory on December 6.

The Laboratory will send a preliminary technical scope of work covering the 100 Area and 300 Area aspects of both of these assemblies to Wilmington by January 15 and a final scope by April 1.

9. Mark III

The current experimental model of the plate fuel element assembly was specifically designed to permit test irradiations at the current D₂O pumping capacity and accordingly cannot take advantage of the gains possible with increased D₂O pumping capacity. A high productivity production model of this assembly, taking advantage of the projected increase in D₂O pumping capacity, can be made by changes such as increasing rib height and modifying the internal dimensions of the housing tube.

The Laboratory will:

- (a) Design a production model Mark III assembly for a reactor load of about 80 tons and begin procurement of revised components.

- (b) Transmit a revised technical scope to Wilmington by December 15.
- (c) Continue making experimental assemblies of the current design for irradiation tests until the arrival of components permits work to be started on the production model.
- (d) Continue development of Mark V assembly.

10. Tentatively, the next Steering Committee Meeting will be held at the Laboratory on December 13.

11. Attached for information are:

Appendix A - Financial Status

Appendix B - Theoretical Physics Program

Appendix C - Experimental Physics Program

Appendix D - Pile Engineering Program

Appendix E - Technical Division Study Status

LCE:EV
Attach.

TECHNICAL DIVISION

L. C. Evans

ANNEX

FINANCIAL STATEMENT

Process development and basic research... on the...
... 1,176... 2,847,000, approximately 1,000,000 of it,
... the Financial Plan. This... of...
... 2,000,000 for the year... 1,000,000...
... 1,000,000... 1,000,000...
... of the... will... of...
... 1,000,000... 1,000,000 in view of the...
... am.

APPENDIX B

SAVANNAH RIVER LABORATORY
THEORETICAL PHYSICS PROGRAM
NOVEMBER 1, 1955 TO JANUARY 31, 1956

<u>Study Code</u>		<u>Estimated Man Months</u>
8518	Theoretical Physics	40

PROGRAM*

- I. Natural Uranium Loads
 - A. Experimental Liaison
 - B. Mark I Loads
 - Rod Positioning (axial temperature limiting)
 - Spiking - Weak Control Rods
 - Xenon Transients
 - C. Mark VII Loads
 - Rod Positioning (surface temperature limiting)
 - Spiking - Weak Control Rods
 - Temperature Distribution in Slug
 - D. Mark III and V Loads
 - Spiking
- II. 88 Loads
 - Contaminant Buildup
- III. Tritium Producer
 - A. LM Load
 - Rod Positioning
 - B. Mark VI Parameters
 - Experimental Analysis
 - Reactivity Changes and Production

*The following program will be modified as required to conform with the agreements reached by the Steering Committee. Specifically, this would include (a) possible deemphasis on the tritium slug loading (b) possible reduced emphasis on Mark III and increased emphasis on Mark V depending on outcome of November 21 meeting in Wilmington.

APPENDIX B (CONT'D)

- IV. Reactor Theory
 - A. Neutron Energy Spectrum
 - B. Reactor Kinetics
 - C. Migration Area in the Thermal Region
 - D. Measurements of Reactivity Changes
 - E. Neutron Slowing Down (Mark V for ϵ and p)
- V. 100 Area Assistance
 - Multiregion Problems
- VI. Physics Area Assistance
 - Exponential Experiments
- VII. Mathematical Theory
 - A. Numerical Integration (two-group simple diffusion, or P_3)
 - B. Improvements of Relaxation Techniques
- VIII. Outside Assistance
 - A. Mixer-Settler
 - B. Bluenose
 - C. Temperature Distribution in New Fuel Elements
 - D. Accounting Department

APPENDIX C

SAVANNAH RIVER LABORATORY
EXPERIMENTAL PHYSICS PROGRAM
NOVEMBER 1, 1955 TO JANUARY 31, 1956

<u>Study No.</u>		<u>Estimated Man Months</u>
8519	Experimental Pile Physics	70

PDP PROGRAM*

- I. Mark V - 105 ton load
Bucklings - water expulsion
November 1 - 16
- II. Mark VII - undersize
Bucklings - water expulsion
November 17 - 23
- III. Spiking - Weak Control Rods
Proposed first production case
Number of spikes - rod configurations
Flux distributions
November 24 - December 9
- IV. Spiking - Mark VII
Mark VII in central unloading zone
Number of spikes - rod configurations
Flux distributions
December 9 - 23
- V. Spiking very low reactivity lattices
Investigate spiking for increasingly lower reactivities
December 23 - January 13
- VI. Kinetics
Experiments to resolve discrepancies between k, periods,
and bucklings seen on both PDP and 105 reactors
January 13 - 31

SP PROGRAM*

- I. Mark I
Reference case with good water
November 1 - 11
- II. Mark VI - Single Assemblies
Flux traverses through single assemblies
All proposed designs
Intermittent - November 11 - December 31

*The comments on Theoretical Physics Program also apply to these programs.

- III. Mark VI - Full Loading
 - Slug Targets
 - Buckling and water expulsion
 - December 1 - 20
- IV. Mixed Lattices - Mark III and Mark VI
 - Average bucklings
 - Flux distributions
 - December 20 - January 15
- V. Mark III
 - Bucklings of standard design
 - Single assembly traverses on new designs
 - January 15 - January 31
- VI. Miscellaneous
 - Cobalt control rods
 - Calibration foils for Los Alamos neutrino experiment
 - Danger coefficient testing
 - Metal temperature coefficient experiments

APPENDIX D

SAVANNAH RIVER LABORATORY
PILE ENGINEERING PROGRAM
NOVEMBER 1, 1955 TO JANUARY 31, 1956

<u>Study Code</u>		<u>Estimated Man Months</u>
8506	100 Area - Chemical Development	19
8507	100 Area - Reactor Component Design Studies	24
8509	100 Area - Hydraulic and Heat Transfer Studies	33
8520	100 Area - Development Engineering	38

PROGRAM*

I. Irradiations at SRP

- A. Mark III
- B. Mark IV
- C. Mark V
- D. Mark VI
- E. General

II. Effects of Higher Temperatures and Flows

- A. Effect of Cross-flow on Fuel Elements
- B. Monitoring at High Flow Rates
- C. Erosion and Cavitation
- D. Cooling Pond Studies

III. Production Design of Fuel Elements

- A. Mark III - High Flow Design, Interim
- B. Mark IV - None
- C. Mark V - Series and Parallel Flow
- D. Mark VI - Interim and Ultimate Designs

*The comments on the Theoretical Physics Program also apply to this program.

APPENDIX D (CONT'D)

- IV. Studies of Fuel Element Performance
 - A. Fuel Failure Studies (Loop)
 - B. Monitoring of Mark V and VI
 - C. Monitoring of Mark VII
 - D. Vibration Studies - Mark III and V
 - E. General Flow Tests - Mark III, IV, V, VI, VII
 - F. Residual Stresses in Fuel and Targets
 - G. Operating Stresses in Fuel Elements
- V. Problems of Reactor Operation at High Output
 - A. Determine Thermal Stresses in the Thermal Shield
 - B. Studies of Coolant Supply Requirements
 - C. Measurements of Heat Removal from Irradiated Fuel
 - D. Detection of Fuel Failures
 - E. Location of Defective Fuel
 - F. Decontamination of Moderator (H_2O and Radioactivity)
 - G. New Reactor Studies
- VI. Fuel Handling Problems
 - A. Removal of Mark III Fuel from 105-R
 - B. Survey of Contamination Problem from Fuel Cutting
 - C. Prototypes of Devices to Unload Fuel
 - D. Devices to Handle Fuel Elements During Inspection

TECHNICAL DIVISION STUDY STATUSDPJ-55-15-11

Study No.	Title	Man Mo.	From	To	Man Mo. Used Against Authoriz.	Total Man Mo. Used FY-1956	Program	Budget
8501	Nondestructive Testing	0	10/1/55	12/31/55	0	0	60% MD 40% MD	2722 2771
8502	300 Area Process Development - Present Components	3	10/1/55	12/31/55	0	.20	MD	2722
8503	New Fuel Element Fabrication	23	10/1/55	12/31/55	7.45	28.65	MD	2722
8504	Protective Coatings for New Fuel Elements	55	10/1/55	12/31/55	19.25	61.25	MD	2722
8505	Corrosion	12	10/1/55	12/31/55	5.00	17.50	40% MD 20% MD 20% MD 20% CPD	2722 2742 2771 2724
8506	100 Area - Chemical Development	19	11/1/55	1/31/56	0	21.25	85% RPD 15% RPD	2723 2730
8507	100 Area - Reactor Component Design Studies	24	11/1/55	1/31/56	2.55	18.86	60% RPD 40% RPD	2723 2730
8508	Instrument Development - 300 Area	25	10/1/55	12/31/55	0	29.85	85% MD 15% MD	2722 2771
8509	100 Area - Hydraulic and Heat Transfer Studies	33	11/1/55	1/31/56	0	56.59	80% RPD 20% RPD	2723 2730
8511	Separations Process and Equipment Demonstration	42	9/1/55	11/30/55	24.75	51.55	80% CPD 20% CPD	2724 2730
8512	Separations Process Chemistry	55	9/1/55	11/30/55	32.70	69.90	90% CPD 8% CPD 2% CPD	2724 2730 2744
8513	Separations Engineering Development	42	9/1/55	11/30/55	23.85	56.90	90% CPD 5% CPD 5% CPD	2724 2730 2744

TECHNICAL DIVISION STUDY STATUSDPW-55-15-11

Study No.	Title	Man Mo.	From	To	Man Mo. Used Against Authoriz.	Total Man Mo. Used FY-1956	Program	Budget
8514	Instrument Development - 200 Area	34.5	10/1/55	12/31/55	10.35	44.25	85% CPD 15% CPD	2724 2730
8515	Instrument Development - 100 Area	20.5	10/1/55	12/31/55	6.20	23.35	85% RPD 15% RPD	2723 2730
8517	Separations Process Hazards	3	9/1/55	11/30/55	.65	1.75	CPD	2724
8518	Theoretical Physics	40	11/1/55	1/31/56	0	43.40	65% RPD 33% RPD 2% RPD	2723 2730 2743
8519	Experimental Pile Physics	70	11/1/55	1/31/56	0	86.20	75% RPD 25% RPD	2723 2730
8520	100 Area - Development Engineering	38	11/1/55	1/31/56	0	50.10	60% RPD 40% RPD	2723 2730
8521	Hydriside Development	0	9/1/55	11/30/55	0	0	CPD	2730
8522	Analytical Chemistry Development	29	9/1/55	11/30/55	20.70	37.35 ^{37.95}	10% MD 5% RPD 75% CPD 10% CPD	2722 2723 2724 2730
8523	Waste Handling	8	9/1/55	11/30/55	2.90	4.40	CPD	2724
8524	New LM Elements	12	10/1/55	12/31/55	2.55	31.85	60% MD 40% MD	2730 2771
8525	Fluid Pressure Facility		(For construction only)				MD	2722
8526	Recycle Facility		(For construction only)				CPD	2704
8527	Recycle Development	2	9/1/55	11/30/55	2.60	6.30	CPD	2704
8528	Heat Treating Facility		(For construction only)				MD	2722